CLAIMS

We claim:

1. A computer implemented method for storing data comprising:

storing a composite data stream so that it may be restored, said storing including,

decomposing the composite data stream into a plurality of constituent data streams;

segmenting at least one of the plurality of constituent data streams; and

discarding those of the segments resulting from said segmenting which are determined to have been stored previously.

2. The computer implemented method of claim 1, wherein said decomposing includes:

storing a composite data stream map that indicates how to recompose the plurality of constituent data streams into the composite data stream.

3. The computer implemented method of claim 1 wherein a first of the plurality of constituent data streams is user data and a second of the plurality of constituent data streams is administrative data.

4. The computer implemented method of claim 1, wherein said storing further comprises:

determining a first of said plurality of constituent data streams is administrative data that may be restored by regeneration rather than being stored; and

discarding said first constituent data stream.

5. The computer implemented method of claim 4 wherein the administrative data is tape markers and/or header information, such as time stamps.

6. The computer implemented method of claim 1 wherein the storing comprises segmenting each of the plurality of constituent data streams.

7. A computer implemented method for efficiently storing data comprising:

receiving over time a plurality of composite data streams, said plurality of composite data streams representing snapshots of data residing at a set of one or more sources taken over said time; and

storing each of said plurality of composite data streams so that it may be restored, said storing including,

decomposing the composite data stream into a plurality of constituent data streams; and

storing using segment reuse a set of one or more of said plurality of constituent data streams, said storing using segment reuse including performing the following for each of said set of constituent data streams,

segmenting the constituent data stream, and

storing only those segments of the constituent data stream that cannot be restored using segments already stored as a result of storing a previous one of said plurality of composite data streams.

8. The computer implemented method of claim 7, wherein said decomposing includes:

storing a composite data stream map that indicates how to recompose the plurality of constituent data streams into the composite data stream.

9. The computer implemented method of claim 7, wherein a first of the plurality of constituent data streams is user data and a second of the plurality of constituent data streams is administrative data.

10. The computer implemented method of claim 1, wherein said storing each of said plurality of composite data streams further comprises:

determining a first of said plurality of constituent data streams is administrative data that may be restored by regeneration rather than being stored; and

discarding said first constituent data stream.

11. The computer implemented method of claim 10, wherein the administrative data is tape markers and/or header information, such as time stamps.

12. A computer implemented method for storing data comprising:

storing a composite data stream so that it may be restored, said storing including,

decomposing the composite data stream into a plurality of constituent data streams; and

backing up each of said plurality of constituent data streams separately, said backing up including,

applying segment reuse to back up a first set of one or more of said plurality of constituent data streams.

13. The computer implemented method of claim 12, wherein said decomposing includes:

storing a composite data stream map that indicates how to recompose the plurality of constituent data streams into the composite data stream.

14. The computer implemented method of claim 13, wherein said backing up includes:

discarding a second set of one or more of said plurality of constituent data streams because they are administrative data that may be restored using regeneration as opposed to storage.

15. An apparatus to back up data comprising:

an interface agent to receive over time composite data streams representing snapshots of data residing at a set of one or more sources;

a composite data stream decomposer/recomposer, coupled to said interface agent, to decompose composite data streams into their constituent data streams, and to recompose composite data streams from their constituent data streams; and

a segment reuse storage system, coupled to said composite data stream decomposer/recomposer, to store and restore constituent data streams.

16. The apparatus of claim 15 further comprising:

a map file storage, coupled to said composite data stream decomposer/recomposer, to store data indicating how to recompose composite data streams from their constituent data streams.

17. The apparatus of claim 15 further comprising:

an administrative data regenerator, coupled to said composite data stream decomposer/recomposer, to regenerate data from constituent data streams that was not stored because that data could be restored by regeneration.

18. The apparatus of claim 17 wherein the administrative data is regenerated in accordance with composite data stream attribute data retrieved from a configuration file.

19. The apparatus of claim 15 wherein the composite data stream decomposer/recomposer is a machine-readable medium having stored thereon a set of instructions, which when executed by a set of one or more processors, cause the operations of the composite data stream decomposer/recomposer to be performed.

20. The apparatus of claim 15 wherein the composite data stream decomposer/recomposer is an application specific integrated circuit.